

WHAT IS CLAIMED IS:

1. A semiconductor laser comprising:
 - a substrate;
 - a nitride semiconductor layer made of a nitride semiconductor on said substrate and having a stripe-shaped opening;
 - a buried layer burying said stripe-shaped opening and made of a nitride semiconductor containing at least two kinds of group III elements, said buried layer including a first portion lying in and above said opening and a second portion lying on said nitride semiconductor layer, said first portion of said buried layer being different from said second portion of said buried layer in composition ratio of said at least two kinds of group III elements; and
 - an active layer formed on said buried layer.
2. The semiconductor laser according to claim 1 wherein said first portion of said buried layer has a higher refractive index than said second portion of said buried layer.
3. The semiconductor laser according to claim 2 wherein said buried layer contains aluminum, and aluminum composition of said first portion of said buried layer is lower than said second portion of said buried layer.
4. The semiconductor laser according to claim 3 wherein said buried layer is made of AlGa_N.
5. The semiconductor laser according to claim 1 wherein said buried layer has a superlattice structure made by alternately forming at least two kinds of nitride semiconductor layers which are different in composition, and wherein at least one of said at least two kinds of nitride semiconductor layers in said superlattice structure contains at least two kinds of group III elements, and said nitride semiconductor layer containing said

at least two kinds of group III elements varies in composition ratio of said at least two kinds of group III elements between said first portion of said buried layer and said second portion thereof.

6. The semiconductor laser according to claim 5 wherein said buried layer has a superlattice structure of AlGaIn and GaIn.

7. The semiconductor laser according to claim 1 wherein said nitride semiconductor layer is configured to partly block a current injected into said active layer.

8. The semiconductor laser according to claim 1 wherein the surface of the buried layer is a substantially flat surface.

9. A semiconductor laser comprising:

a substrate;

a first cladding layer of a first conduction type made of a nitride semiconductor of a first conduction type on said substrate;

a current blocking layer formed on said first cladding layer of the first conduction type and having a stripe-shaped opening which partly exposes said first cladding layer of the first conduction type, said current blocking layer having a first layer of a nitride semiconductor formed adjacent to said first cladding layer of the first conduction type and a second layer of a nitride semiconductor formed on said first layer, said first layer being made of a material more likely etched than said second layer and said first cladding layer of the first conduction type;

a second cladding layer of the first conduction type made of a nitride semiconductor of the first conduction type lying in and above said opening and on said current blocking layer so as to bury said stripe-shaped opening; and

an active layer formed on said second cladding layer of the first conduction type.

10. The semiconductor laser according to claim 9 wherein

aluminum composition of said first layer of said current blocking layer is lower than aluminum composition of said second layer of said current blocking layer and aluminum composition of said first cladding layer of the first conduction type.

11. The semiconductor laser according to claim 10 wherein said first cladding layer of the first conduction type is made of $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ($0.05 \leq x \leq 0.3$), said second layer of said current blocking layer is made of $\text{Al}_y\text{Ga}_{1-y}\text{N}$ ($0.05 \leq y \leq 1$, $x \leq y$), and said first layer of said current blocking layer is made of $\text{Al}_z\text{Ga}_{1-z}\text{N}$ ($0 \leq z < 0.3$, $z < x$).

12. The semiconductor laser according to claim 9 wherein said first cladding layer of the first conduction type is made of $\text{In}_x\text{Ga}_{1-x}\text{N}$ ($0 \leq x \leq 0.05$), said second layer of said current blocking layer is made of $\text{In}_y\text{Ga}_{1-y}\text{N}$ ($0 \leq y \leq 0.05$), and said first layer of said current blocking layer is made of $\text{In}_z\text{Ga}_{1-z}\text{N}$ ($0.05 \leq z \leq 0.3$, $z > x$, $z > y$).

13. The semiconductor laser according to claim 9 wherein the surface of the buried layer is a substantially flat surface.

14. A semiconductor device comprising:
 a base body having at least one recess; and
 a buried layer made of a nitride semiconductor containing at least two kinds of group III elements lying on said base body to bury said recess with a part thereof, said buried layer including a first portion lying in and above said recess and a second portion lying outside of said recess wherein, said buried layer varying in composition ratio of said at least two kinds of group III elements between said first portion and said second portion.

15. The semiconductor laser according to claim 14 wherein said first portion of said buried layer has a higher refractive index than said second portion if said buried.

16. The semiconductor laser according to claim 15 wherein said

buried layer contains aluminum and has a lower aluminum composition in said first portion than in said second portion.

17. The semiconductor laser according to claim 14 wherein the surface of the buried layer is a substantially flat surface.

18. A semiconductor laser manufacturing method comprising:
forming a nitride semiconductor layer by a crystal growth for crystallographically growing a nitride semiconductor on a substrate;

selectively etching said nitride semiconductor to form a stripe-shaped opening;

forming a buried layer by crystallographically growing a nitride semiconductor containing at least two kinds of group III elements in and above said opening and on said nitride semiconductor layer; and

for forming an active layer of a nitride semiconductor on said buried layer.

19. The semiconductor laser manufacturing method according to claim 18 wherein said buried layer is made of AlGaIn.

20. The semiconductor laser manufacturing method according to claim 18 wherein said nitride semiconductor layer is a layer which blocks part of a current injected into said active layer.

21. A semiconductor laser manufacturing method comprising:
sequentially forming on a substrate an etching stop layer of a first conduction type nitride semiconductor, an etching layer of a nitride semiconductor and an etching mask layer of a second conduction type nitride semiconductor, said nitride semiconductor of said etching layer being more likely etched than those of said etching mask layer and said etching stop layer;

partly etching said etching mask layer to form a stripe-shaped first opening to expose a part of said etching layer in said first opening;

heating said etching layer in a mixed atmosphere containing hydrogen and at least one of nitrogen, ammonium, helium, argon,

xenon and neon, or a mixed atmosphere of nitrogen and ammonium, or a hydrogen atmosphere to etch said etching layer exposed in said first opening and thereby form a stripe-shaped second opening to expose a part of said etching stop layer;

burying said first opening and said second opening with a buried layer of a first conduction type nitride semiconductor; and

forming an active layer on said buried layer.

22. The semiconductor laser manufacturing method according to claim 21 wherein said etching stop layer is made of $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ($0.05 \leq x \leq 0.3$), said etching mask layer is made of $\text{Al}_y\text{Ga}_{1-y}\text{N}$ ($0.05 \leq y \leq 1$, $x \leq y$), and said etching layer is made of $\text{Al}_z\text{Ga}_{1-z}\text{N}$ ($0 \leq z < 0.3$, $z < x$).

23. The semiconductor laser manufacturing method according to claim 22 wherein the temperature of heating said etching layer is higher than 800°C and does not exceeds 1150°C .

24. The semiconductor laser manufacturing method according to claim 21 wherein said etching stop layer is made of $\text{In}_x\text{Ga}_{1-x}\text{N}$ ($0 \leq x \leq 0.05$), said etching mask layer is made of $\text{In}_y\text{Ga}_{1-y}\text{N}$ ($0 \leq y \leq 0.05$), and said etching layer is made of $\text{In}_z\text{Ga}_{1-z}\text{N}$ ($0.05 \leq z \leq 0.3$, $z > x$, $z > y$).

25. The semiconductor laser manufacturing method according to claim 24 wherein the temperature of heating said etching layer is in the range from 600°C to 800°C .

26. An etching method for selectively etching a first nitride semiconductor layer relative to a second nitride semiconductor layer comprising:

etching said first nitride semiconductor layer by heating it in a mixed atmosphere containing hydrogen and at least one of nitrogen, ammonium, helium, argon, xenon and neon; or a mixed atmosphere of nitrogen and ammonium; or and a hydrogen atmosphere.

27. The etching method according to claim 26 wherein aluminum composition of said second nitride semiconductor layer is higher than aluminum composition of said first nitride semiconductor layer.

28. The etching method according to claim 26 wherein indium composition of said second nitride semiconductor layer is lower than indium composition of said first nitride semiconductor layer.